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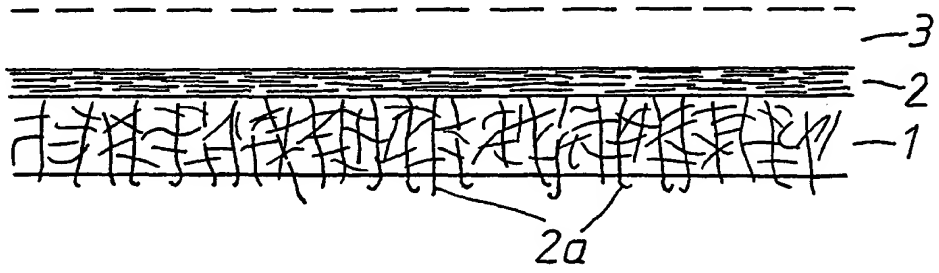

(57) Abstract

Flexible base web of a construction covering, such as floor or wall covering or a roofing comprises a main layer (1) extending over the greatest part of the thickness of the web. The main layer is constituted of a non-woven mineral fibre mat containing predominantly discontinuous mineral fibres, such as rock wool or slag wool or glass wool fibres which are bonded to each other mechanically. A thin layer (2) containing thermally bondable fibres (1) is interposed between the main layer (1) and a coating layer (3) of polymeric synthetic material.

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Flexible base web for a construction covering, and a construction covering manufactured from said web

The invention relates to a relatively thin flexible web, which is meant for use as a base web for construction coverings. The invention relates also to construction coverings, such as floor or wall coverings or roofings, manufactured form said web.

It is known to use as a base of different building materials, such as floor or wall coverings, roofing felts etc., a felt-like material for effecting sound/or thermal insulation. Especially good step sound dampening properties and also thermal insulation capability as well as capability of protecting constructions from possible fire are required particularly in the case of floor and wall coverings. Same properties, especially concerning the fire protection, are required in the case of roofing felts.

The webs in question and building materials having such webs as their bases, as well as other manufacturing methods of the same are widely discussed in patent litterature, for example in European Patent Application 176,847 (Hoechst AG), German Offenlegungsschrift 1,919,709 (Saint Gobain), German Offenlegungsschrift 3,226,041 (Didier-Werken AG), US-patent 4,657,801 (Hoechst AG), British Patent 1,532,621 (Nairn Floors Ltd.), German Offenlegungsschrift 3,017,018 (GAF Corporation) and US-patent 4,175,514 (GAF Corporation).

Said patents and patent applications disclose webs and products manufactured therefrom having no optimal

thermal insulation and fire protection properties nor processability in manufacture.

The object of the present invention is to effect an improvement concerning the above mentioned products. For realizing the purpose the web according to the invention is mainly characterized by what is disclosed in characterizing portion of claim 1. The web has a main layer, the principal construction of which is constituted of discontnuous mineral fibres (most preferably at least 50 w-%). The fibres are bonded together mechanically. The main layer forms the greatest layer in the base web in thickness and in grammage (weight per unit area). In addition, the base web may have an additional layer for improving its adherence or strength. The base web is preferably fabricated in a dry process using air stream, in which case the main layer is formed of randomly oriented mineral fibres. Further, according to one advantageous embodiment, the layer containing mineral fibres contains in addition blend fibres of different type, such as glass fibres chopped from filaments, or synthetic fibres, which blend fibres also are bonded to the mineral fibres and each other by needling. Further, according to a preferred embodiment, onto the layer comprising mineral fibres is secured a thinner surface layer containing thermally bondable fibres, which layer most preferably is secured to the mineral fibre layer by needling too. Said surface layer comprises preferably at least two different fibre materials having different melting points. Further, the invention emcompasses various coverings having the base web of the invention as their carrier layer and a polymeric impervious layer, such as PVC of CPE, as the coating layer of the base web.

The invention will be described in the following more closely with reference to accompanying drawings, where

Fig. 1 shows schematically the web of the invention in cross-section,

Fig. 2 shows the web according to another alternative as well as a product manufactured therefrom in cross-section, and

Fig. 3 illustrates a method for manufacturing the web of the invention.

The main layer is denoted by reference numeral 1 in Figs. 1 and 2. The main layer comprises mainly discontinuous mineral fibres, such as mineral wool, glass wool or slag wool fibres or ceramic fibres or carbon fibres, generally relatively short discontinuous fibres. The term "discontinuous fibre" means in this context the opposite of a filament fibre. By virtue of a good adherence effected by the invention, the weight of the main layer 1 may be quite large, such as 2000 g/m². Grammage of the main layer may, however, vary within a wide range, e.g. between 80-2000 g/m². An optimal fire protection and sound dampening without need for making the main layer too thick is achieved with values 200-600 g/m². The density of the main layer is preferably over 200 kg/m^3 for achieving a good insulation capability. The length of the mineral fibres in the main layer is mostly within a range of 1-20 mm, preferably 4-10 mm. In the case of glass wool fibres and carbon fibres, the above-mentioned values may be greater. Considering the costs and thermal resistance, mineral wool and slag wool fibres are preferred.

The non-woven mineral fibre mat forming the main layer 1 is manufactured preferably using a dry method without chemical binders. The term dry method implies in this context that the pre-treated discontinuous

fibres have been blown by means of an air stream on top of a perforate wir to form a mat while the air stream passes through said wire. Reference is made to a previous Finnish Patent Application No. 880755 by the Applicant, describing said method in more details. Pre-treated fibres, that is, mineral fibres, which are disentangled from each other so thoroughly as possible prior to forming the mat and from which impurities have been removed after the melt-spinning of the mineral fibers, have been used as a raw material for the mat.

A separate coating layer 3 applied on top of the base web for making a sandwich-type construction covering may be any applicable hardenable paste which is adhered to the base web by the effect of heat and/or chemical bonding. Alternatively the top of the base web can be provided with the coating layer 3 in a film form by laminatig by heating the surface of the film to the softening temperature before it is joined to the surface of the base web. The coating layer is may be of any synthetic polymeric material forming a closed impervious top surface of the construction covering. Suitable materials are e.g. PVC (polyvinyl chloride) or CPE (chlorinated polyethylene).

The fibres of the main layer 1 can be mixed with other fibres as well, called hereinafter "blend fibres" during the forming of the fibrous mat, for example with chopped glass fibres in an amount not higher than 40 w-% or with synthetic fibres, such as with polyester, in an amount not higher than 20 w-%. The term "chopped glass fibre" means that the chopped glass fibres are prepared by cutting continuous glass filament into shorter fibres, whereby these fibres have homogenic properties as regards thickness and strength, making them useful as a reinforcing fibre in a web the rest of which is mainly constituted of

fibres of not so uniform properties, such as rock wool or slag wool fibres. The upper limit of the amount of chopped glass fibres is determined by their relatively high price. The term "synthetic fibre" means fibre of a synthetic polymeric material. The blend fibres mixed inside the main layer in course of the mat laying process together with the mineral fibres can be utilized in forming the strength of the fibrous mat without decreasing its fire protection or sound dampening properties. When the main layer 1 is made to a consolidated layer mechanically by needling, the fibres mixed in the above-described manner serve as an aid for this purpose. Especially where the medium length of the blend fibres is greater than that of the mineral fibres, these fibers serve effectively as the contributing factor to the strength. The blend fibres can also be used as an aid in consolidating the web by subjecting the fibrous mat forming the main layer 1 to a light thermal bonding.

Where the blend of fibers is used, the medium length of the synthetic fibres can be e.g. 20-25 mm and the medium length of the chopped glass fibers can be ca 50 mm. In this case, the length of the mineral fibres can be within the range of 3-10 mm. The curvature or "crimp" of the synthetic fibres is also an asset in bonding the mineral fibres together.

In Fig 1 is shown a base web according to one embodiment of the invention, a so-called combination web. The base web is a non-woven flexible mat manufactured of relatively short fibres described hereinabove. The main layer 1 of the combination web consists mostly of discontinuous mineral fibres and on top of it there is a surface layer 2 containing fibres bonded together thermally. The surface layer 2 is quite thin, 0,5-1 mm, and is constituted either wholly or partly of such discontinuous fibres orientated paral-

lelly with the main plane of the base web, hereinafter called bonding fibers, which in a thermal treatment can be melted and which thereby bond the fibres together. The thermal treatment takes place preferably at a temperature 100-200 °C. The surface layer can contain at least two materials melting at different temperatures. By melting the fibres of one material entirely in a thermal treatment the surface layer retains its fibrous structure due to the other fibres having a higher melting point.

A coating layer 3 may be fixed thermally to the base web either by bringing it in a melted state onto the web, or by melting the layer partly on the side facing the web before bringing it into contact with the base web. After coming in contact with the web the melted polymeric material on solidifying binds the coating layer 3 to the web. One advantage of the invention when the combination web is coated thermally with a coating layer 3 brought to a suitable state, e.g. with a melted paste or with a partly melted film, is that the coating layer and the supporting main layer 1 can in this case not directly interact with each other. When a coating layer in a melted flowing state is used, the material would without the presence of a separating material penetrate quite deeply into the main layer 1 causing a not-uniform change in the properties of the layer, and it can thus not be controlled easily for finding an advantageous optimum state. In this case, undesirable alterations in quality ought to be accepted, or much efforts and expenses ought to be used solely for reaching a uniform quality. When a paste is used its consumption would be large due to the open fibrous structure of the mineral fiber layer of the web in comparison to the use the paste is meant for. The separating effect of the surface layer 2 is more important in the case of

flowing coating paste, but it has also a bonding effect to be discussed hereinafter.

The surface layer 2 acts also as a bonding layer between the coating 3 and the main layer 1. Because the surface layer 2 has fibres bondable thermally together, they are also bonded due to the hot coating paste firmly to the coating layer. If the surface layer has two different fibre materials having different melting points, the fibres of the higher melting material can first be bonded together so, that the lower melting material is caused to melt during a thermal treatment of the base web before the coating, as presented hereinabove. The coating with the coating layer on top of the combination can thereafter be carried out at the melting temperature of the higher melting material.

By choosing the components of the surface layer 2 according to the actual need, the adherence properties can be controlled within a wide range without any side effect on the other properties of the main layer 1. The bonding fibres of the surface layer may comprise e.g. polyethylene melting at ca 100 °C and polyester melting at ca 200 °C. Also other material combination may be used, such as polyethylene-polypropene or polypropene-polyester. The above-mentioned substances shall be understood to mean also their copolymers, that is, polymers containing their monomeric units, or also their derivatives, that is, polymers having the carbon skeleton of the basic polymer and the bonds between the monomeric units, but different side groups.

The combination web of the invention affords versatile possibilities for use as parts of different construction materials. For example a coating paste to be spread at a later stage can not penetrate into the actual main layer, which can be any web structure

containing predominantly mineral fibres. The properties of the main layer can thus be optimized in course of the manufacture of the combination web quite exactly to be on a desired level, without needing to worry about the changes of these properties due to another material spread or attached onto the web at a later stage.

The surface of the surface layer 2 is smooth towards the coating layer 3 after the heat treatment following the needling, to such an extent that it has no protruding fibres. Its porosity can be, however, adjusted in a controllable manner by choosing the fibre grades and the thermal treatment according to the need in order to afford a good adherence surface for the paste. The adherence is also promoted by chemical bonding, which can be effected by treating the surface according to the need using methods known as such.

The reference numeral 2a denotes in Fig 1 schematically the fibres of the surface layer which due to needling extend transversely in the main layer 1 and of which a part is exposed on the opposite side of the main layer. It is also possible to use these synthetic fibres 2a forming a pile-like structure on the opposite side of the main layer 1 as an aid in attaching the coating layer 3 onto the main layer 1. On this side the fibres 2a form a surface which can be formed to a thin film in a thermal pretreatment, on which film the plastics material of the coating layer can easily be secured thermally either by laminating in the above-mentioned manner or as a melted paste. It is thus possible to form also on the opposite side of the main layer a sort of thin surface layer having separating and binding effect. If the coating layer 3 is attached on this side, the surface layer 2 constitutes the lower free surface of the web and acts merely as a reinforcing layer in this case.

The amount of the thermally bondable bonding fibres in the surface layer 2 can be 10-100 p-% of the entire fibrous amount of the layer. 20-40 p-% has proved to be an advantageous range. The fibres of the surface layer 2 are also discontinuous fibers. The weight of the surface layer can alter between 10-100 g/m², and the length and thickness of the fibres respectively between 2-30 mm and 4-30 um. The rest of the fibres of the surface layer 2 can be fibres not thermally bondable, such as other synthetic polymer fibres which can not be thermally bonded.

In Fig. 2 there is shown a product suitable especially as a covering material on roofs. The product is manufactured by using a base web of the invention as the carrying layer. The covering material comprises a coating layer 3 protecting from weather conditions, beneath of which is the base web of the invention, on which the layer 3 is fixed either by applying a coating layer as a melted paste on top of it or by laminating the coating layer 3 and the base web together in a heated calendering machine. The coating layer 3 can be PVC (polyvinyl chloride) or CPE (chlorinated polyethylene) plastics or other weather-resistant plastics material. Chlorinated plastics materials have been proven useful, as they, in addition to good weather resistance and processability, have fire resisting properties due to their chlorine content.
In the following, the position of some fibres inside the base web of Fig. 2 are discussed in more detail, these fibre arrangements serve to improve the strength of the web and are also applicable to the web shown in Fig. 1. The base web contains in consistency with the example of Fig. 1 a main layer 1 formed of discontinuous mineral fibres using a dry method. The web may contain also blend fibres discusse hereinabove. The portion of these blend fibres can be greater in the

proximity of one of the surfaces of the main layer 1 than that is in the middle, in which case the strength of the product is improved. Blend fibres can be in this case fibres blended inside the main layer 1 originally during the dry method forming of the mat, whereafter they have been shifted upon needling to the proximity of one of the surfaces. When preparing the product by laminatig the coating layer 3, this mass centre of the blend fibres may lie on the opposite side of the main layer 1 compared with the coating layer 3. The coating layer 3 laminated to the free mineral fibres and blend fibers on the other side and said blend fibers promote the strengthening of the main layer 1 from the opposite sides, and the structure comprises in addition blend fibres extending due to needling and their greater length transversely in the direction of thickness of the main layer 1, thus connecting said two sides with each other. Such blend fibres extending in the direction of thickness can also be the fibres of the separate surface layer 2, the ends of which due to the needling have become exposed also on the opposite side of the main layer 1, and the coating layer 3 can be fixed on this side on which the ends are exposed. In case these blend fibres are thermally bondable fibres, a film can be formed of them prior to fixing of the coating layer in the manner described above referring to Fig. 1.

It shall be understood that in the case of partly melting the surface of a thermoplastic coating layer in laminating process, the penetration of the coating layer material into the base web is not necessarily so pronounced as would be the case if a flowing melted paste were used. In this case the coating layer 3 is practically separated in the depth direction from the main part of the main layer 1 even in absence of a separating layer on its surface. If the transversely extending fibres are of such type that no separating

film can not be formed of them, such as chopped glass fibres, the joining of a coating layer 3 by thermally laminating in the above-mentioned manner to the surface on which the ends of the transversely extending blend fibres are exposed would result in improved strength but not to any inferior quality due to an excessive impregnation of the main layer 1 with the coating material.

The manufacturing stages of the main layer 1 of Fig. 2 comprise the laying of the mineral fibres mixed with the optional blend fibers on a perforated wire to form a mat e.g. in a manner which is described in Finnish Patent Application No. 880755. After this stage the layer is compressed to a desired density, generally over 200 kg/m^3, whereafter the needling is performed immediately. The stroke length in the needling can be adjusted to comply with the thickness of the layer. If blend fibres are present, the needling can be effected so that the blend fibres move closer to the other surface and even will be exposed on the other surface. The chopped glass fibres, if present as blend fibres, are broken upon needling to a shorter length. The synthetic fibres, if present as blend fibres, remain intact in this process. The two-sided construction obtained in the needling process by means of blend fibres is of use considering the strength of the final product. If either chopped glass fibres or synthetic fibres are used as blend fibers, the strength of the main layer 1 can thus be created by virtue of the fact that there is more blend fibres in the proximity of one of the surfaces than in the middle, in which case the coating layer 3 can be fixed by the above-mentioned laminatig method, that is, the surface of a coating layer constituted of thermoplastic material is heated to the softening temperature and it is joined at this state to the surface of the main layer. The blend fibres act as a

reinforcing factor in the way described in the preceding paragraph.

A good strength for the main layer 1 can thus be ensured without any chemical binders, which in normal dry method using rock wool are used even in an amount of 50 % of the weight of the fibres, having a harmful effect on the fire resistance of the product.

In Fig. 2, the layer thinner than the main layer 1 and comprising thermally bondable fibres is denoted by a broken line 2. The layer is between the main layer 1 and the coating layer 3 in the same fashion as in the combination web of Fig. 1. The fibres of this thin layer 2 may be, in conformity with the example of Fig.1, polyethylene, polypropylene or polyester discontinuous fibres or they may be some blend of the above-mentioned fibre grades, and the layer 2 can be bonded to the main layer 1 by needling.

The base web is fixed at its free surface onto a support 4, which in a roof construction can be any support structure, such as a rock wool or chipboard plate or a plate of cellular polystyrene or polyurethane. The fixing is carried out, depending on the underlying material, with a suitable glue, which in Fig. 2 is denoted by layer 5, or by nailing. The covering material can also be fixed directly on top of an old roofing felt when renovating roof coverings. The base web can also be laid as a separate layer against the support 4, whereafter the coating layer is laid on top of the middle layer. Both layers can be fixed mechanically on the support in thuis case.

It shall be noted that the blend fibres of the main layer 1 are of use when using a glue layer 5, because the transversely extending blend fibres are attached

to the glue on one side and are connected to the coating layer 3 on the opposite side.

The main layer 1 of the base web of the covering material prevents as a thin mat of only ca 1-3 mm in thickness and having no chemical binders surprisingly well the spreading of fire to constructions beneath and also prevents the migration of the substances separated during the fire from the coating layer 3 to other constructions beneath. The experiments have shown also that during a normal use the main layer 1, having no chemical binders, prevents the migration of small-molecule compounds during a long term use either from the coating layer 3 or from the glue layer 5 equally well as do the synthetic polymer fibres generally used for this purpose. One advantage of the base web in accordance with the invention, having no connection to fire protection, is that it can be used as a well-setting "bearing layer" between the coating layer 3 and the support 4, in which case the covering as a whole is well laid on uneven supports.

Fig. 3 shows a manufacturing line for producing the base web of the invention. The discontinuous mineral fibres forming the main layer 1 are fed, optionally blended with other fibres, in the direction of arrow A, by means of a perforated conveyor belt 15. The fibres have been previously brought on the belt by means of a very fast rotating spike roll, known as such, using an air stream, in a state where they are well separated from each other. At this stage the mat on the belt 15 is somewhat wave-like.

The transport conveyor 15 carries the fibrous mat forward to a point 16 where the fibrous mat comes underneath a vertical air channel 17 disposed above the conveyor. In the air channel air is blown downwards in the direction of arrow B in such a fashion

that the air goes through the fibrous mat, denoted by a broken line in the figure, and through the conveyor 15 and passes further along a chann l disposed underneath the conveyor. At the same time the fibrous mat is compressed against the conveyor 15, which effect is illustrated by a broken line. In the inlet direction of the conveyor there is a gap between the front wall of the air channel and the conveyor 15, through which the thick fibrous mat passes to cross the air channel. In the rear wall of the channel at the point where the compressed fibrous mat leaves the channel 15, there is a roll 18 which on rotating in contact with the upper surface of the fibrous mat seals at the same time the gap present at this location. The fibres forming the surface layer 2 in accordance with the invention are supplied into the air channel 17 above the point where the fibrous mat enters the channel 17. The supply takes place along an obliquely downwards directed channel 19 which joins the channel 17. The fibres are fed into the channel by means of a fast rotating spike roll which disentangles and slings the fibres into the channel 19 from which they are caught with the air stream of the air channel 17, which presses the fibres on top of the rest of the fibrous mat. In this way a thin fibrous layer 2 having an even surface can be created on top of the main layer 1 as early as at this stage due to the fact that the points containing less fibres in the main layer 1 permit the air better to pass through, whereby these points automatically collect more fibres of the surface layer with the air stream B.

After the conveyor 15 the combination web so obtained is passed to needling, at which stage part of the fibres of the surface layer are orientated towards the main layer 1 by punching mechanically by needles. These fibres connect and bind mechanically the fibres of the surface layer 2 to those of the main layer 1.

Depending on the thickness of the fibrous mat and the length of th discontinuous fibres of the surface layer 2 the fibres can in this case become exposed also on the opposite side, and the back side is thereby provided with a pile-like structure by virtue of these protruding fibres penetrated through the main layer from the surface layer. The spike rolls and the needling are known previously in other fibre technology and they are therefore not described in greater detail. After the needling the fibres of the surface layer can be bonded together using thermal treatment, e.g. using temperatures within a range of 100 C - 200 C, depending on the materials of the surface layer. Heat treatment devices known previously can be used in the method.

The surface layer 2 can also be manufactured so that a thicker mineral fibre mat forming the main layer 1 is formed on top of the thin surface layer formed previously on the wire, in which case the method is in principle the same as above. Also in this case the layers can be bonded to each other by subsequent needling.

It is of course possible to influence on the grammage and the density of the fibrous mat by the supply rate of the fibres and by the velocity of the air stream B. As a common rule, by using fast rotating spike rolls disentangling effectively the fibres from each other, the mat obtained is provided with a more bulky texture, in which the fibres are more randomly oriented.

After the heat treatment the mat obtained can be wound e.g. into a roll and it can be used later as the raw material in the above-mentioned constructional elements.

The above described operational stag s can be used also in cases where the surface layer 2 is not formed to the main layer 1.

Example

A web according to Fig. 1 and forming the main layer 1 was manufactured from rock wool fibres having the length below 5 mm and the thickness of 6 um. The web had the final thickness of ca. 3 mm. The fibres were collected to form a web in such a fashion that they became randomly oriented. The weight of this layer was ca. 600 g/m^2.

On the upper surface of this main layer was sucked by means of an air stream a surface layer having the thickness of ca. 0.5 mm consisting of polyester fibres and polyethylene fibres of a length of ca. 20 mm and of a thickness of ca. 20 um. The weight of the surface layer was estimated to be ca. 100 g/m^2. The surface layer was fastened to the main layer by needling. After the fastening the surface layer was heat treated at a temperature of ca. 100 °C for obtaining the final combination web, at which stage the polyethylene fibres melted and glued the polyester fibres to each other.

After the heat treatment the binding layer could be seen on the surface of the main layer as a ca. 1 mm thick light-coloured layer against the brownish colouring of the main layer, that is, of the rock wool fibres. The binding layer could not be separated from the main layer by traction, but the entire combination web was disintegrated.

A PVC-paste layer was applied onto the combination web to form a coating layer having the final thickness of ca. 1mm. The melted paste layer caused simultaneous-

ly the melting of the polyester fibres, whereby the coating layer became firmly fixed on the surface layer. The combination web could not be s parat d on traction from this surface either, but the entire combination web was disintegrated.

The building element according to the invention has proved to have a good dimensional stability and step sound dampening capability.

In addition, some fire resistance experiments conducted with covering materials falling within the scope of the invention will be described in the following:

Experiment 1

Covering constructions having the size of 400 mm x 1000 mm were prepared from the samples (constructions A, B and C). The constructions of the test pieces were as follows, starting from the upper face:

Construction A

- "Alkorplan" single ply cover 1,2 mm (PVC coating layer)
- Mineral fibre web, consisting of rock wool fibres and comprising 15 % polyester fibres, bonded by needling
- Surface membrane PX 120/3800 (bituminous roofing felt of ca. 2-3 mm in thickness)

The surface membrane PX had been glued to a chipboard support, and the mineral fibre web and the "Alkorplan" covering had been fixed by nailing to said support.

Construction B

- Surface membrane PX 120/3800
- Mineral fibre web (Construction A)
- Aluminium-coated polyurethane plate having a thickness of 55 mm

The different layers had been fixed by nailing to the polyurethane plate.

Construction C

- Surface membrane PX 120/3800
- Mineral fibre web, 2 layers (Constr. A)
- Polystyrene plate having a thickness of 100 mm, grade N.

The surface membrane PX and the mineral fibre webs had been fixed by nailing to the polystyrene plate.

The measured thickness of the mineral fibre web used in the experiments was ca. 2-3 mm and the mass was 480 g/m^2.

Experiments:
The fire resistance was determined according to the standard SFS 4194:E, Determination of the fire resistance of coverings against an exterior fire (Nordtest-method NT FIRE 006, VTT-1251-80). The results of the experiments are shown in Annexes 1 and 2.

Summary:
On the experiment results it can be concluded that the covering materials A, B and C tested met the requirements set for a covering material of moderate fire spreading. These requirements are presented in the publication by the Nordic Committee on Building Regulations (NKB Product Rules 7, January 1989).

Experiment 2
The following samples were tested in the experiment.

Number 1

- Covering layer Alkorplan 35076 (1,2 mm thick PVC)
- Intermediate layer mineral fibre web (rock wool) containing ca. 10-12 % polyester, thickness ca. 2 mm and grammage ca. 340 g/m^2, bonded by needling
- One polystyrene plate, thickness 50 mm and density 19 kg/m^2.

Number 2

- Covering layer and intermediate layer as hereinabove
- Polyurethane plate as a support, thickness 50 mm, density 41 kg/m^3.

Number 3

- Covering layer as hereinabove
- Mineral fibre web as an intermediate layer (rock wool) containing ca. 15 % polyester fibres and having a thickness of ca. 1,5 mm and a grammage of ca. 280 g/m^2, bonded by needling
- Polystyrene plate as a support, thickness 50 mm, density 19 kg/m^3.

A calcium silicate plate served as a support for all three samples.

A test according to the standard DS/INSTA 413, corresponding to the Nordtest-method NT FIRE 006 was used as the test method. The results of the experiments are shown in Annex 3.

ANNEX 1

Construction A

Wind speed	2 m/s				4 m/s			
Experiment no.	1	2	3	$\bar{x}$	4	5	6	$\bar{x}$
Covering was ignited, s	35	35	35	35	40	40	35	38
Flames went out, min:s	4:55	5:40	5:20	5:18	3:35	3:25	3:30	3:30
Glowing ended, min:s	11:25	12:55	10:35	11:38	9:35	9:20	9:00	9:18
Length of damage in covering, cm *)	54	50	55	53	50	52	56	53
Length of charred area in support, cm *)	24	25	29	26	27	25	30	27

*) as measured from the centre of the gridiron

Construction B

Wind speed	2 m/s				4 m/s			
Experiment no.	1	2	3	$\bar{x}$	4	5	6	$\bar{x}$
Covering was ignited, s	30	35	35	33	40	40	40	40
Flames went out, min:s	7:30	6:15	6:35	6:47	5:05	4:50	5:45	5:13
Glowing ended, min:s	9:00	9:20	8:30	8:57	7:20	6:55	7:30	7:15
Length of damage in covering, cm *)	51	44	46	47	45	44	46	45
Length of charred area in support, cm *)	36	39	39	38	41	39	41	40

*) as measured from the centre of the gridiron

ANNEX 2

Construction C

Wind speed	2 m/s				4 m/s			
Experiment no.	1	2	3	$\bar{x}$	4	5	6	$\bar{x}$
Covering was ignited, s	35	35	35	35	35	40	40	38
Flames went out, min:s	5:10	5:05	5:20	5:12	3:55	3:30	4:35	4:00
Glowing ended, min:s	8:20	7:25	9:30	8:25	7:15	7:25	7:15	7:18
Length of damage in covering, cm *)	42	45	47	45	45	41	42	43
Length of charred area in support, cm *)	35	39	39	38	37	34	32	34

*) as measured from the centre of the gridiron

ANNEX 3

Sample no.	1	2	3
Ignition of construction, s	14	13	14
Going out of flames, min:s	3:40	4:55	7:05
End of glowing, min:s	9:00*	7:00*	8:00*
Length of damaged area, (as measured from the centre of fire), mm			
- in PVC-layer	450	435	500
- in mineral web	210	255	475
- in the support	445	365	480

* extinguished

Claims:

1. Flexible base web of a construction covering, such as a floor or wall covering or a roofing, **characterized** in that it comprises a main layer (1) extending over the greatest part of the thickness of the web and being constituted of a non-woven mineral fibre mat containing predominantly discontinuous mineral fibres, which are bonded to each other mechanically.

2. Base web as claimed in claim 1, **characterized** in that it is manufactured using a dry method by means of air stream, and its main layer (1) is constituted of mineral fibres orientated randomly.

3. Base web as claimed in claim 1 or 2, **characterized** in that the main layer (1) contains, in addition to mineral fibres, chopped glass fibres, most preferably in an amount no higher than 40 w-%.

4. Base web as claimed in claim 1 or 2, **characterized** in that the main layer (1) contains, in addition to mineral fibres, synthetic fibres, such as polyester, most preferably in an amount not higher than 20 w-%.

5. Base web as claimed in claim 3 or 4, **characterized** in that the medium length of the blend fibres of the layer (1) is greater than that of the mineral fibres.

6. Base web as claimed in any of claims 3-5, **characterized** in that the portion of the blend fibres is greater in the proximity of one of the surfaces of the main layer (1) than in the middle of the layer.

7. Base web as claimed in claims 1 or 2, **characterized** in that on the surface of the main layer (1) there is thermally bondable fibres.

8. Base web as claimed in claim 7, **characterized** in that on the surface of the main layer (1) there is a separate surface layer (2), which is thinner than the main layer and contains thermally bondable fibres.

9. Base web as claimed in claim 9, **characterized** in that the thermally bondable fibres of the surface layer (2) comprise at least two fibrous materials having different melting points.

10. Base web as claimed in claim 9, **characterized** in that the fibrous materials of the surface layer (2) are of thermoplastic plastics material, such as polyethylene and polypropene, or polypropene and polyester.

11. Construction covering, such as a floor or wall covering or a roofing, comprising a coating layer (3) of a polymeric material, such as of PVC or CPE, **characterized** in that any base web as claimed in claims 1-10 serves as the base web for the coating layer (3).

12. Construction covering as claimed in claim 11, **characterized** in that the coating layer (3) is fixed onto the base web (1) thermally, for example as a melted paste or by laminating by heat.

13. Construction covering as claimed in claim 12, **characterized** in that the coating layer (3) is bonded thermally to the mineral fibres of the main layer (1) and to the blend fibres present in the main layer in addition to the mineral fibres.

14. Construction covering as claimed in claim 12, **characterized** in that the coating layer (3) is bonded to thermally bondable fibres situated on the surface of the main layer (1).

15. Construction covering as claimed in any of claims 12-14, **characterized** on that the polymeric material of the coating layer (3) is kept separated from the main layer (1), for example by surface layer (2) on the main layer (1).

16. Construction covering as claimed in claim 11, **characterized** in that the coating layer (3) and the base web are fixed on each other mechanically for example by affixing them by means of mechanical fixing members to a support (4).

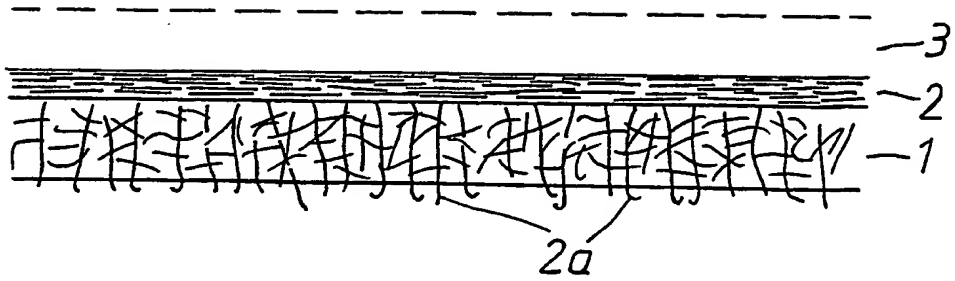

FIG.1

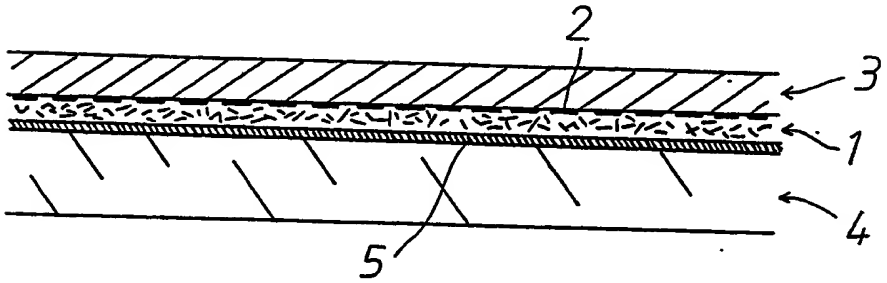

FIG. 2

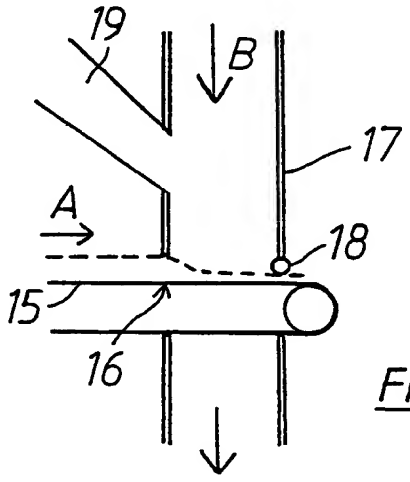

FIG.3

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI 90/00153

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: D 06 N 7/00

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
IPC5	B 32 B; D 04 H; D 06 N

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched[8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US, A, 4522876 (JOHN J. HIERS) 11 June 1985, see figure 5; claims 1,14,18-20 --	1-16
X	GB, A, 1293685 (KUAG TEXTIL A.G.) 18 October 1972, see page 1, line 64 - line 66; page 2, line 25 - line 27; page 2, line 48 - line 54; page 2, line 63 - line 66; claim 1 --	1-16
A	EP, A1, 0315553 (ETABLISSEMENTS FILS D'AUGUSTE CHOMARAT & CIE) 10 May 1989, see the whole document --	1-16
A	EP, A2, 0176847 (HOECHST AKTIENGESELLSCHAFT) 9 April 1986, see the whole document --	1-16

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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
11th September 1990	1990 -09- 13
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Ingrid Falk Ingrid Falk

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.PCT/FI 90/00153

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 90-08-02
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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		EP-A-B-	0187824	86-07-23
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		FR-A-	2844815	00-00-00
		LU-A-	60953	70-08-04
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